

# **Flight Test Instrumentation of the Ohio University Delphin Turbo Jet**

*For the  
Quarterly Review of the NASA/FAA Joint University  
Program for Air Transportation Research  
Thursday January 10<sup>th</sup>, 2002*

**Presented By: Jansen Litter  
Principal Investigator: Dr. Michael Braasch**

**Avionics Engineering Center  
Ohio University, Athens  
Project Sponsor: Joint University Program**



# Purpose

- Application of integrated GPS/INS to high dynamic vehicles
- New equipment installed and tested for system reliability
- GPS data collection will begin when aircraft is flight ready
- Software development for the collection of INS data is on going



# Flight Test Vehicle



- **L - 29 Delphin**
- **High Altitude 11 km**
- **High Speed 354 knots**
- **Fully Aerobatic**

Flight Specs Taken From <http://aeroweb.brooklyn.cuny.edu/specs/aero/l-29.htm>



# Delphin Equipment

Navigation Grade INS Unit

Industrial Keyboard

Industrial Flat Panel Display

Novatel GPS Unit

Tactical Grade IMU

\*The IMU will be integrated into the system at a later date



# Project Development

Initial equipment installation is nearly complete

GPS data collection will begin when flat panel display is installed

\*Flat Panel Display is awaiting installation

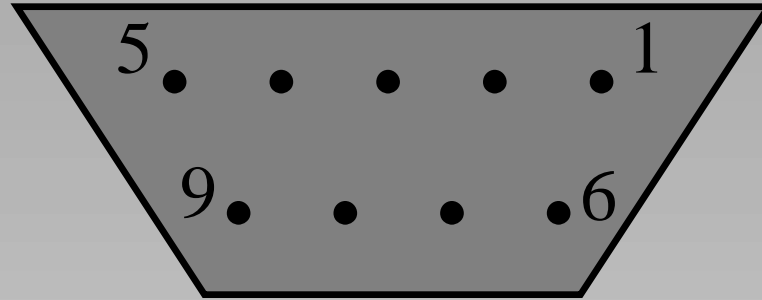


# System Configuration

- T1 and T1A are configured for low speed transmission
- JP4        1&2, 3&4 Jumpered
- JP5        1&2, 3&4 Jumpered
- 1 PPS output is PIN 2 of Novatel I/O connector

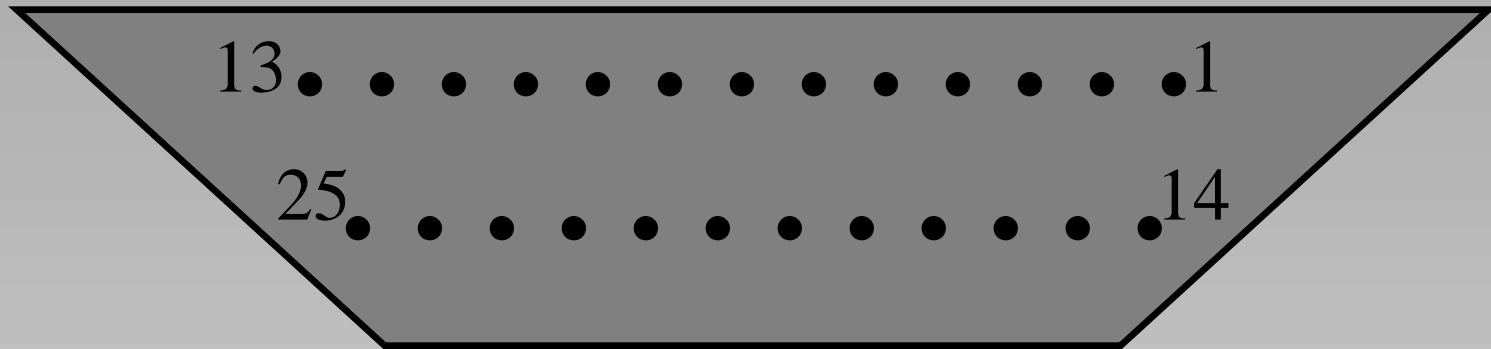


# DB9 Power Output on PC104



1. +5V	5. -12V	9. Not Used
2. GND	6. +5V	
3. +12V	7. GND	
4. GND	8. Not Used	

# DB25 for ARINC J1 on PC104



For Transmission (Tx) and  
Receive (Rx)

“A-side” = HI

“B-side” = LOW



# Pin Out for DB25

1. T1A-B	8. T2-B	14. T1A-A	20. T2A-A
2. T1-B	9. GND	15. T1-A	21. T2-A
3. R2-B	10. NU	16. R2-A	22. DSCR
4. R1-B	11. NU	17. R1-A	23. NU
5. R4-B	12. NU	18. R4-A	24. NU
6. R3-B	13. NU	19. R3-A	25. NU
7. T2A-B			



# INS Data Collection System Power Specifications

Unit	Voltage	Current	Power
INS	115VAC/400HZ	2A	230W
INS(Optional)	28VDC	10A	280W
INS Cooling Fan	28VDC		
PC104	8-32VDC	11A Max	85W Max
ADC	28VDC	350mA	10W Max
Monitor	12VDC	3.5A	42W
GPS	6-18VDC		2.8W(3.3W Max)



# PC104 Power Distribution

Component	Voltage	Current	Power
CPU Module	5VDC	2A(1.5A Max)	10W
CM102 Floppy	5VDC	125mA	625mW
CMT107 Hard-drive	5VDC	1 A max(fused)	5W
Network Card	5VDC	200mA	1W
Keyboard	5VDC	200mA	1W
GPS	+12VDC	235mA	2.8W



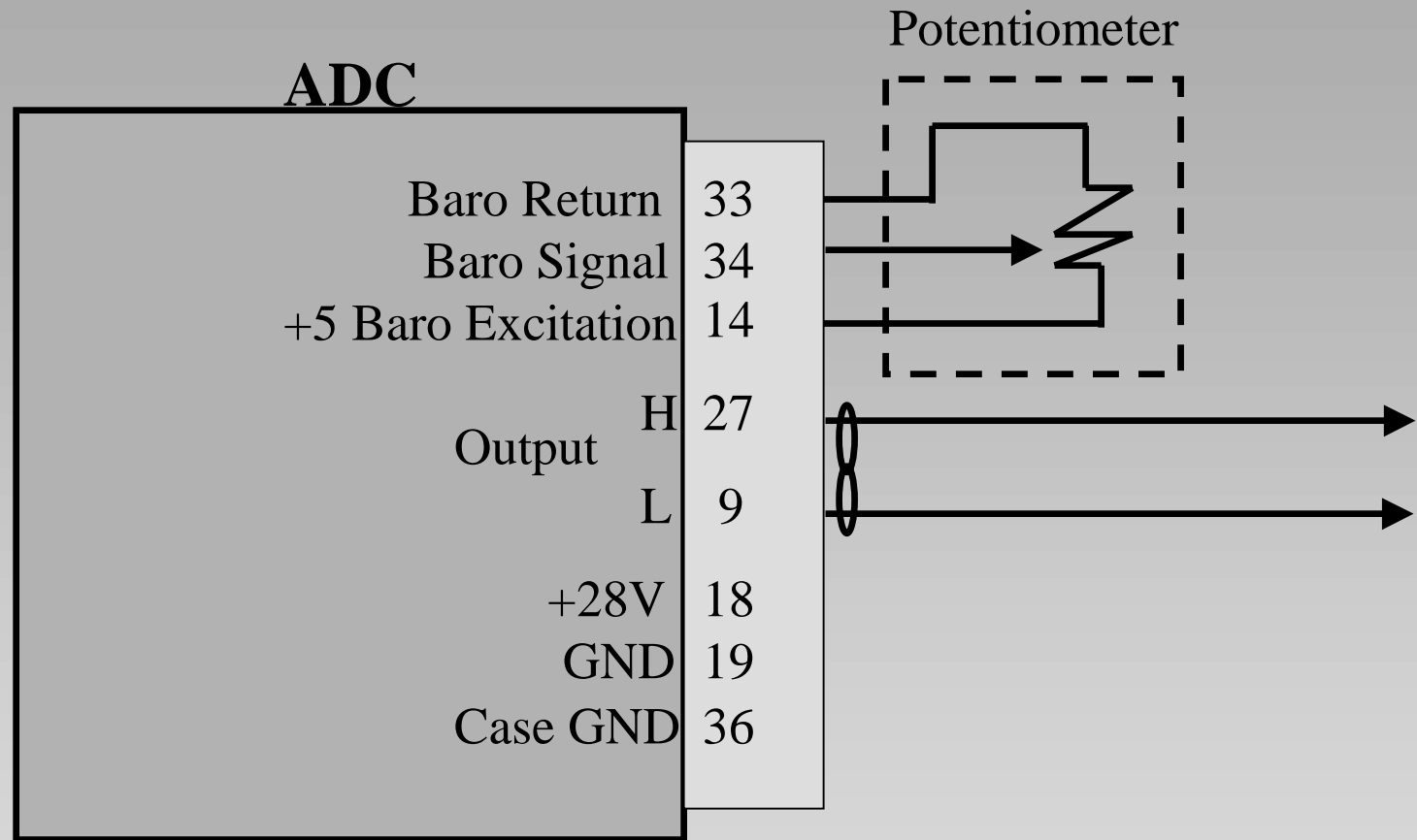
# PC104 Power Availability

Voltage	Current	Power
5VDC	12A	60W
+12VDC	2A	24W
-12VDC	500mA	6W

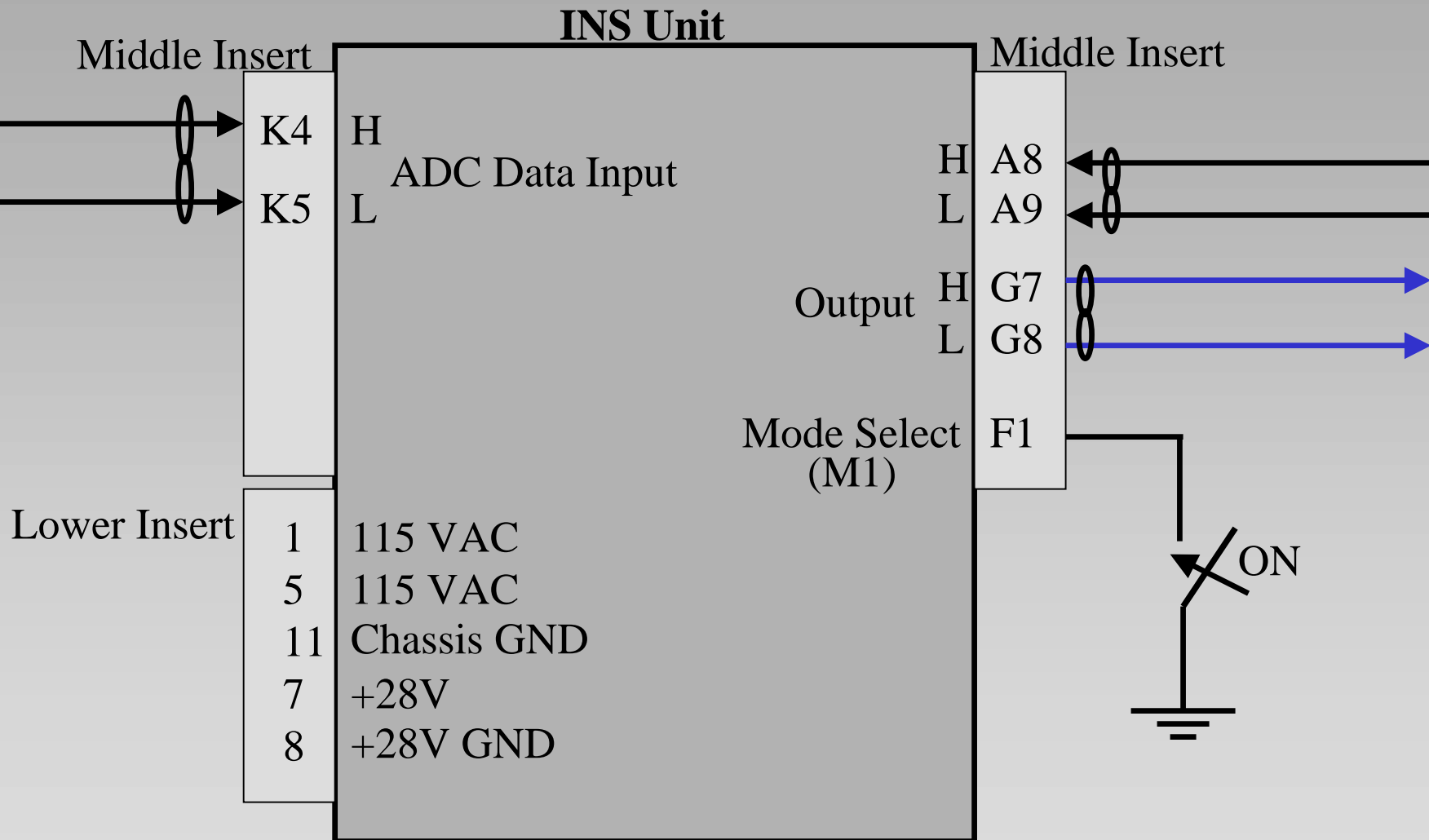
**Maximum Power Output From PC104: 75W**



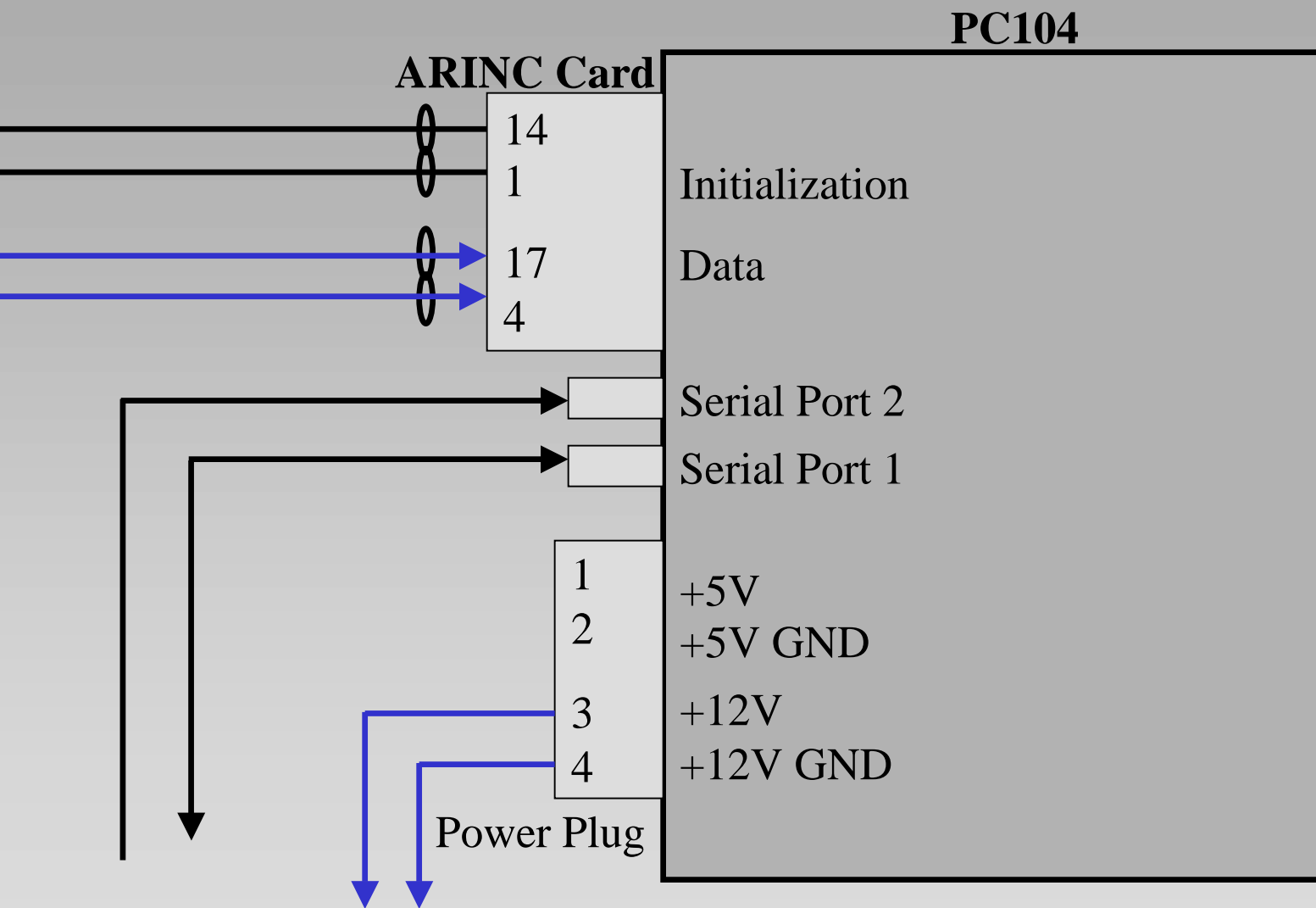
# System Schematic



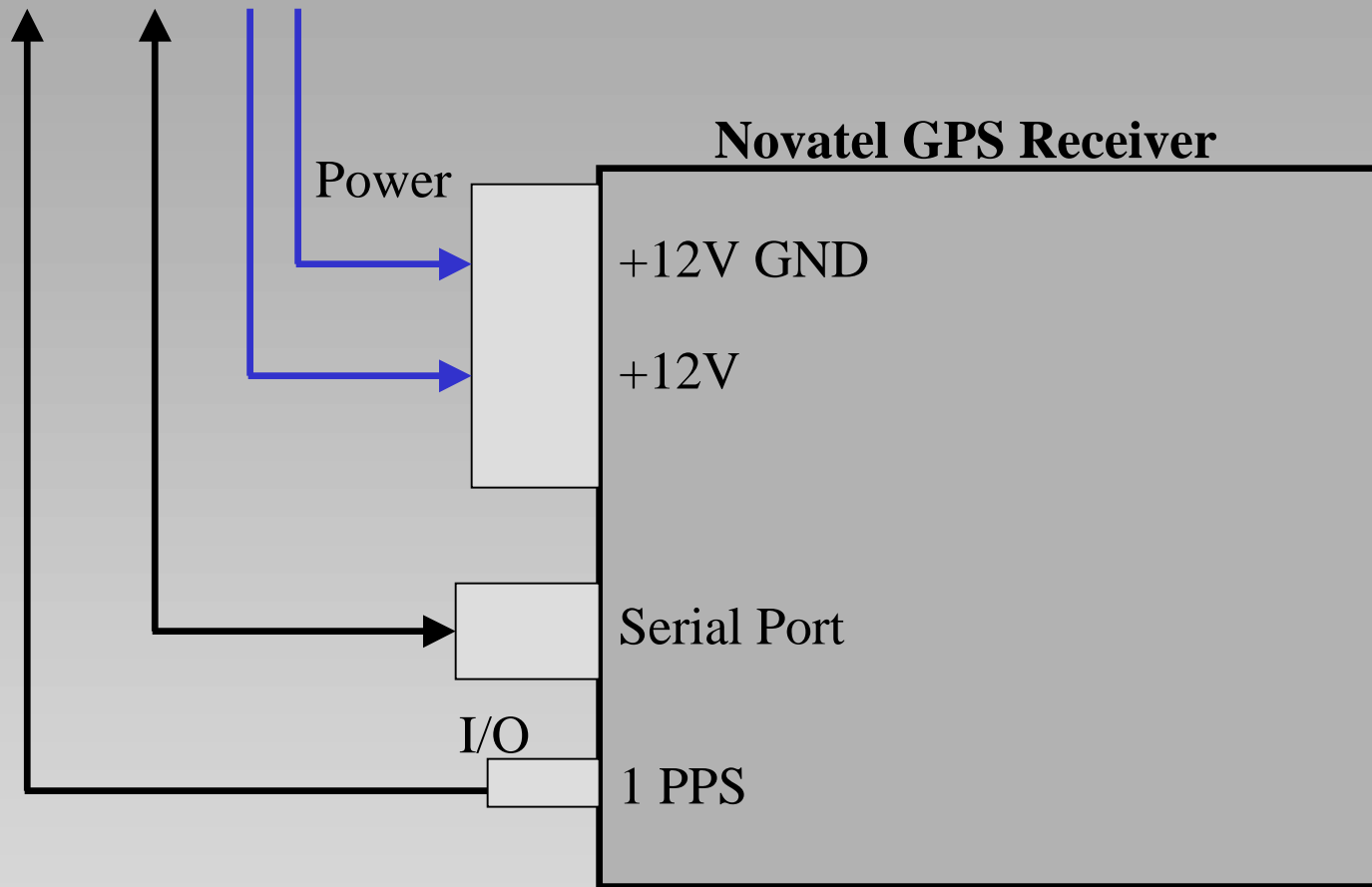
# System Schematic Continued



# System Schematic Continued



# System Schematic Continued





# Installed Equipment

ADC



Inverter



# Installed Equipment Continued

**Industrial Keyboard**



**INS On Switch**



# Installed Equipment Continued

**Novatel GPS Receiver**



**Control Switches**



# Installed Equipment Continued

**Flat Panel Display Power Unit**



**Industrial Flat Panel Display**





# Installed Equipment Continued

## GPS Antenna



# Conclusion

GPS Equipment has been installed and tested successfully

GPS data collection is next phase of project

INS data collection will start when software is complete.



# Contact Information

Principle Investigator: Dr. Michael Braasch

[Braaschm@ohiou.edu](mailto:Braaschm@ohiou.edu)

Research Engineer: Curtis Cutright

[Cutright@ieee.org](mailto:Cutright@ieee.org)

Research Associate: Jansen Litter

[JansenLitter@hotmail.com](mailto:JansenLitter@hotmail.com)

